UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/565,767	01/24/2006	Yuichiro Shindo	OGOSH43USA	2990

270 7590 03/02/2009

HOWSON & HOWSON LLP
501 OFFICE CENTER DRIVE
SUITE 210
FORT WASHINGTON, PA 19034

EXAMINER	
SHEVIN, MARK L	

ART UNIT	PAPER NUMBER
1793	

MAIL DATE	DELIVERY MODE
03/02/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/565,767	SHINDO, YUICHIRO	
	Examiner	Art Unit	
	Mark L. Shevin	1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 December 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,27,28 and 30-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,27,28 and 30-33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *12/23/2008*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Status of Claims

1. Claims 1, 27-28, and 30-33, filed December 23rd, 2008 are pending. Claims 2-26 and 29 were cancelled, claims 30-33 are new, and claim 1 is currently amended.

Acknowledgement of RCE

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on December 23rd, 2008 has been entered.

Information Disclosure Statement

3. The information disclosure statement (IDS) submitted December 23rd, 2008 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement has been considered by the examiner. Please refer to applicants' copy of the 1449 form submitted herewith.

Status of Previous Rejections

4. The previous rejection of claims 1-2 and 26 under 35 U.S.C. 103(a) over **Shindo** (US 2003/0062261 A1) have been maintained and extended to the newly filed claims as well.

Claim Rejections - 35 USC § 103

5. **Claims 1, 27-28, and 30-33** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Shindo** (US 2003/0062261 A1).

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Shindo is drawn to high purity zirconium or hafnium with minimal impurities (Abstract). Shindo discloses in Example 2, beginning at para 0120 a high-purity hafnium sputtering target (claim 4 and Title) with 4N (99.99%) purity level excluding gas components such as carbon, oxygen, and nitrogen (para 0133). Oxygen and carbon are present at less than 500 ppm (claim 6). Table 4 at para 0089 discloses hafnium with a carbon content of 30 ppm, nitrogen less than 10 ppm, and oxygen at 100 ppm. (Table 4 at para 0089). Fe, Cr, and Ni are present at less than 10 ppm (Table 4 at para 0089 and Table 4 at para 0131).

Shindo thus teaches a sputtering target or thin formed therefrom made of a high-purity hafnium material with a 4N purity level excluding gas components of carbon, oxygen, and nitrogen. Examples of hafnium are taught with impurities within the claimed ranges and Shindo further teaches that the zirconium content of the high-purity hafnium material should be 0.5 wt% (5000 wt ppm) or less (claim 1). The disclosed zirconium content thus overlaps the range claimed in claim 1 of the instant application and establishes a *prima facie* case of obviousness with Shindo (See MPEP 2144.05, para I: In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists).

Thus it would have been obvious to one of ordinary skill in the metallurgical arts at the time the invention was made, to choose the instantly claimed ranges through process optimization, since it has been held that there the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. See In re Boesch, 205 USPQ 215 (CCPA 1980).

6. Claims 1, 27-28, and 30-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Murray** (G.T. Murray and T.A. Lograsso, Preparation and Characterization of Pure Metals, *ASM Handbook, Vol. 2,* (1995), p. 1093-1097) in view of **Shindo** (US 2003/0062261 A1).

Murray:

Murray discloses a purified Hf sample with very high purity in Table 2.

Table 2 Impurity concentrations of purified metals. Metallics were determined by glow discharge mass spectroscopy; carbon by combustion; and oxygen, nitrogen, and hydrogen by fusion method.

Impurity element	Impurity concentration of metals, ppm by weight(a)												
	Al	Au	Cu(b)	Ni(b)	Mo	Nb	Re	Ta	Ti	W	V	Zr
C	6	<1	-	-	10	40	5	10	40	5	57	20
H	0.69	<1	-	-	0.9	0.2	0.4	0.2	<0.1	1	0.1	3	3
O	14	2	<5	<10	4.3	25	23.4	0.5	1.5	570	0.8	250	200
N	<3	1	<2	<5	0.5	10	4	1	2.3	30	0.1	3	3
Ag	<0.08	4	<0.04	<0.04	<0.7	<0.01	<0.3	<0.001	<0.004	<0.01	<0.12	<0.002	<0.4
Al	-	<0.01	0.004	0.05	<0.03	0.3	0.15	0.05	0.05	6	0.07	0.1	3
As	<0.02	<0.01	0.34	<0.01	0.5	<0.04	<0.04	<0.002	<0.002	0.08	<0.005	<0.05	<0.04
Au	<0.02	-	<0.01	<0.04	<0.02	<0.15	<0.03	<0.15	<0.3	<0.04	<0.3	0.6	<0.2
B	<0.03	<0.01	<0.04	<0.04	<0.02	<0.01	<0.04	<0.001	<0.04	-	<0.12	<0.02	<0.007
Ca	<0.03	<0.01	0.028	<0.003	0.04	0.1	0.02	0.03	<0.008	<0.6	0.02	0.1	0.04
Cd	<0.02	<0.01	<0.008	<0.04	<1.6	<0.08	<0.5	<0.02	<0.007	0.14	<0.025	<0.05	0.3
Cl	3	<0.01	0.07	0.003	0.4	0.1	0.3	0.1	0.01	<1.8	0.2	0.1	2
Co	<0.07	<0.01	0.022	0.007	<0.06	<0.1	<0.01	0.06	0.3	<0.005	0.1	<0.15	<0.007
Cr	<0.01	<0.01	0.05	-	0.1	1.5	0.03	0.08	0.2	4.1	<0.001	<5	0.5
Cu	0.09	1	-	<0.02	<0.02	<0.04	<0.04	0.005	0.02	2.1	0.001	<0.3	0.04
Fe	0.05	2	1.7	5.4	12	12	0.12	3	0.3	1.5	0.01	<20	50
Ga	<0.01	<0.01	0.05	<0.08	<0.02	<0.4	<0.01	<0.004	<0.003	<0.063	<0.01	20	<0.02
Ge	<0.01	<0.01	<0.03	<0.08	<0.01	<0.2	<0.04	<0.012	<0.005	<0.063	<0.04	<1.6	<0.03
Hf	<0.01	<0.01	<0.002	<0.006	<0.03	<0.03	<0.02	<0.01	<0.4	0.25	<0.04	<0.03	40

Excluding Zr, C, O, and N contents, it has a purity of 6N (99.9999%) or less than 1 ppm of measured impurities. Furthermore, the measured Zr content is only 40 ppm, well within the claimed ranges of 1 to 1000 ppm of the instant claims. Cr and Ni are <0.006 and <0.03 respectively, however Murray does not disclose the contents of C, O, N, and Fe.

Shindo

Shindo in Table 4 at para 0089 discloses hafnium with a carbon content of 30 ppm, nitrogen less than 10 ppm, and oxygen at 100 ppm. (Table 4 at para 0089). Fe, Cr, and Ni are present at less than 10 ppm (Table 4 at para 0089 and Table 4 at para 0131).

Shindo teaches that such impurities hinder the operational performance of semiconductors when impure hafnium material is used a sputtering target (para 0016 and 0017) and that C, O, N, and H gas components should be minimized to prevent the generation of particles during sputtering (para 0014), with the content of impurities being reduced as much as possible (para 0006) -- see also (para 0028-0031).

Regarding claims 1, 27-28, and 30-33, it would have been obvious to one of ordinary skill in the metallurgical arts, at the time the invention was made, to purify the hafnium material of Murray to minimize the Fe, C, O, and N contents to within the claimed range and to use the Hf material of Murray as a sputtering target or thin film as Shindo taught that such impurities should be minimized to prevent the generation of particles during sputtering and to prevent hindering the performance of any semiconductor device containing the deposited Hf material (para 0004 and para 0017) and Hf should be used as a sputtering target because it is a proven gate oxide former for semiconductor devices (para 0002-0006).

Thus it would have been obvious to one of ordinary skill in the metallurgical arts at the time the invention was made, to choose the instantly claimed ranges through process optimization, for the same reasons as stated in the rejections in section 5 above.

Response to Applicant's Arguments:

7. Applicant's arguments filed December 23rd, 2008 have been fully considered but they are not persuasive.

Applicants assert (p. 8, para 2-4, and p. 10-12) that it would not have been obvious to one of ordinary skill in the metallurgical arts, at the time the invention was made, to produce a Hf sputtering target or thin film having a purity of 4N5 to 6N or the required zirconium content of claim 1 because that is no common sense need or motivation for such extreme reduction.

In response, Shindo nevertheless teaches that zirconium content of the high-purity hafnium material should be 0.5 wt% (5000 wt ppm) or less (claim 1). The disclosed Zr content still overlaps the range of instant claim 1 and thus a prima facie case of obviousness is maintained.

Applicants can rebut a *prima facie* case of obviousness based on overlapping ranges by showing the criticality of the claimed range. "The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. . . . In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range." *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). See MPEP § 716.02 - § 716.02(g) for a discussion of criticality and unexpected results

With respect to Applicant's statements as to the inability of the prior art of Shindo to achieve the optimized higher purity of the instant claims, especially in terms of Zr

content, these statements as presented are in the form of attorney argument and thus are not of probative value. The examiner would consider objective experimental data or statements to this effect having sworn support in the form of a declaration or affidavit.

From MPEP 2145, para 1: Rebuttal evidence and arguments can be presented in the specification, *In re Soni*, 54 F.3d 746, 750, 34 USPQ2d 1684, 1687 (Fed. Cir. 1995), by counsel, *In re Chu*, 66 F.3d 292, 299, 36 USPQ2d 1089, 1094-95 (Fed. Cir. 1995), or by way of an affidavit or declaration under 37 CFR 1.132, e.g., *Soni*, 54 F.3d at 750, 34 USPQ2d at 1687; *In re Piasecki*, 745 F.2d 1468, 1474, 223 USPQ 785, 789-90 (Fed. Cir. 1984). However, arguments of counsel cannot take the place of factually supported objective evidence. See, e.g., *In re Huang*, 100 F.3d 135, 139-40, 40 USPQ2d 1685, 1689 (Fed. Cir. 1996); *In re De Blauwe*, 736 F.2d 699, 705, 222 USPQ 191, 196 (Fed. Cir. 1984).

Conclusion

-- Claims 1, 27-28, and 30-33 are rejected
-- No claims are allowed

The rejections above rely on the references for all the teachings expressed in the texts of the references and/or one of ordinary skill in the metallurgical art would have reasonably understood or implied from the texts of the references. To emphasize certain aspects of the prior art, only specific portions of the texts have been pointed out. Each reference as a whole should be reviewed in responding to the rejection, since other sections of the same reference and/or various combinations of the cited references may be relied on in future rejections in view of amendments.

All recited limitations in the instant claims have been met by the rejections as set forth above. Applicant is reminded that when amendment and/or revision is required, applicant should therefore specifically point out the support for any amendments made to the disclosure. See 37 C.F.R. § 1.121; 37 C.F.R. Part §41.37 (c)(1)(v); MPEP §714.02; and MPEP §2411.01(B).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark L. Shevin whose telephone number is (571) 270-3588 and fax number is (571) 270-4588. The examiner can normally be reached on Monday - Friday, 8:30 AM - 5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy M. King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

/Mark L. Shevin/
Examiner, Art Unit 1793

February 11th, 2009
10-565,767

/George Wyszomierski/
Primary Examiner
Art Unit 1793